

US EPA ARCHIVE DOCUMENT

Anticipating California Levee Failure: Government Response Strategies for Protecting Natural Resources from Freshwater Oil Spills

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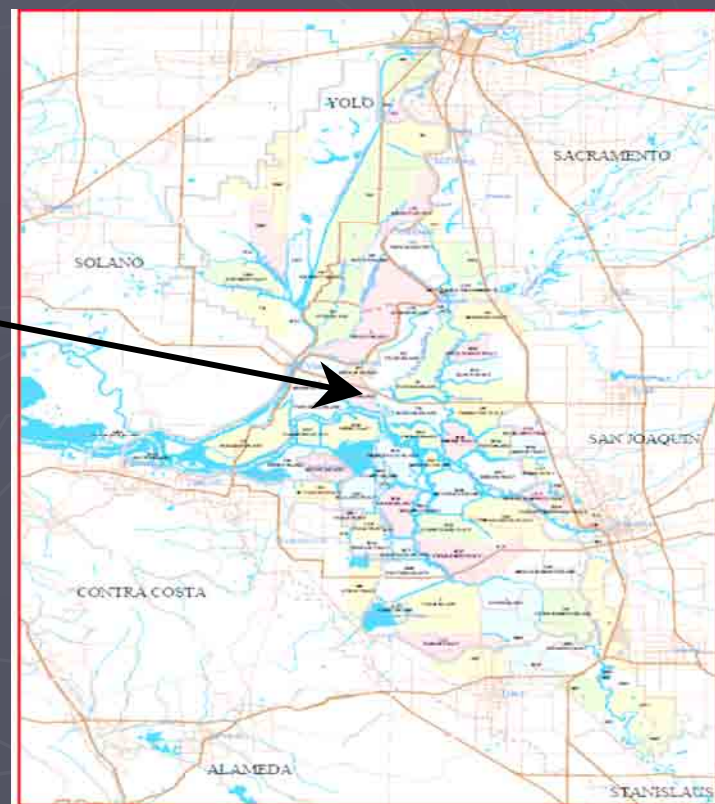
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May 3, 2006

The Sacramento- San Joaquin Delta

- ▶ 57 islands
- ▶ 1,100 miles of levees
- ▶ Habitat for over 500 species of flora and fauna



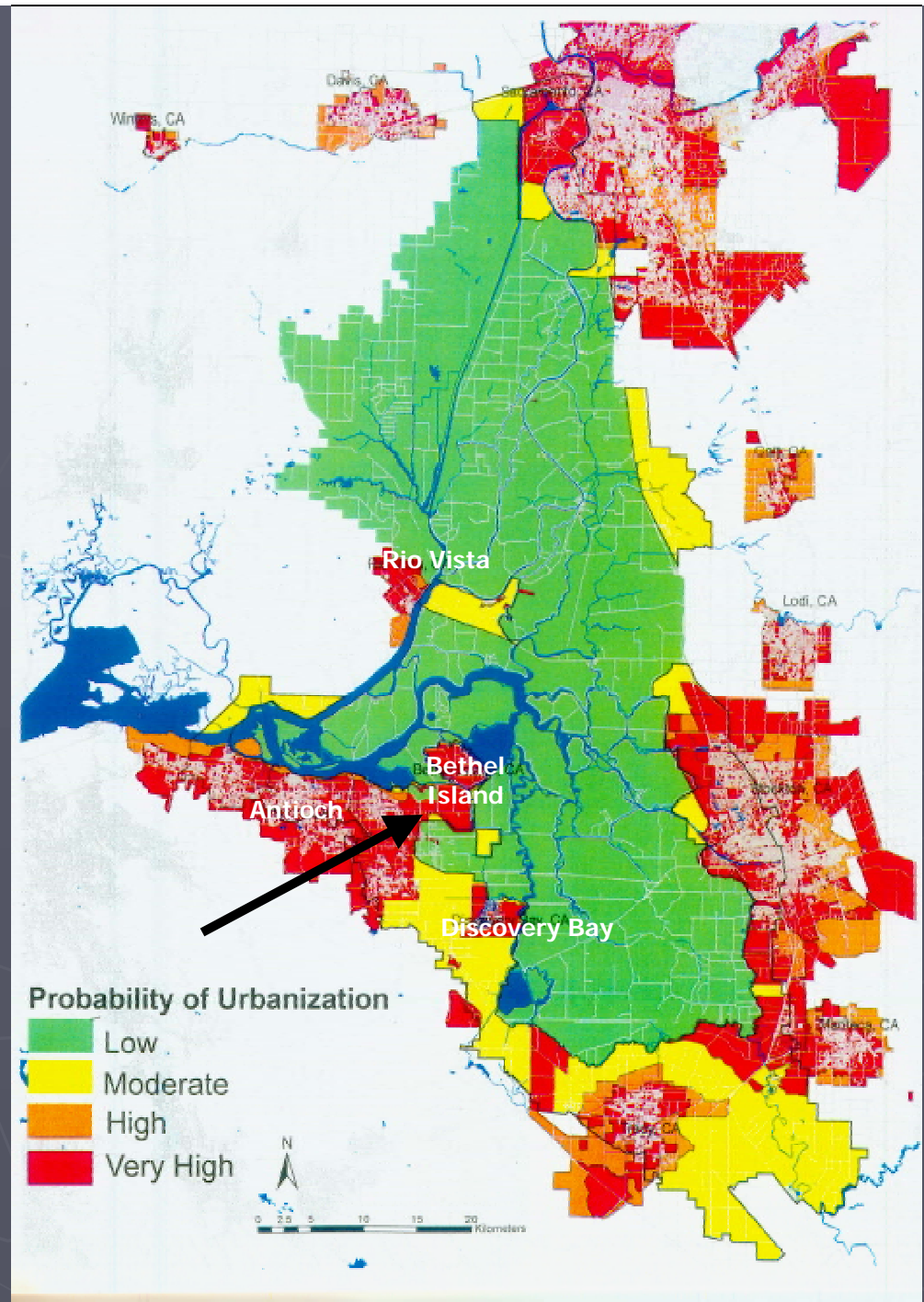
Delta History

- ▶ Historically brackish water and seasonal wetland habitat
- ▶ “Reclaimed” farm land
- ▶ Hydraulic mining



Development in the Delta

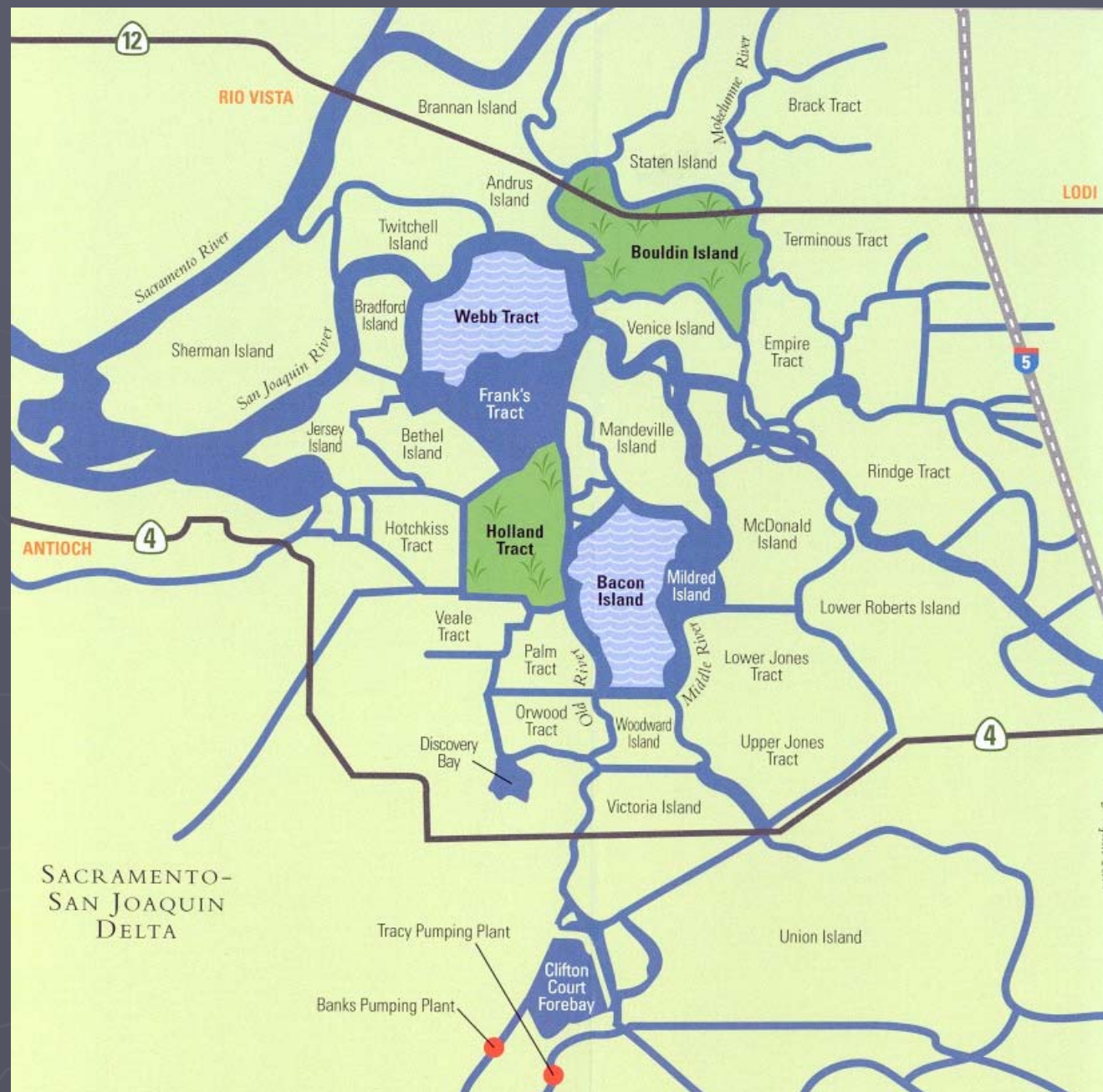
- ▶ New housing developments on Bethel Island
- ▶ Increases in infrastructure: Gas stations, etc.



Uses for Delta water

- ▶ Provides 23 million California residents with potable and agricultural water
 - 520,000 acres of agricultural production
 - Nearly \$500 million in various crops produced annually
- ▶ Habitat for migratory and native species
- ▶ State Water Project (SWP)
- ▶ Federal Central Valley Project (CVP)

Levee Tracts in the West Delta



Source: Delta Wetlands Project

Levee Vulnerability

- ▶ Levees built to withstand 100-year event
- ▶ During a 30-year period, there is a 26% chance that homeowners living behind a levee will experience a flood larger than the 100-year flood



Potential Causes of a Levee Breach

- ▶ Natural phenomena
 - Subsidence
 - Burrowing wildlife
 - ▶ Suspected cause of Jones Tract levee failure
- ▶ Catastrophic events
 - Severe storms
 - ▶ Levee breaches in January and March, 2006
 - Earthquakes
 - ▶ Magnitude 6.5 or greater





Extensive Flooding from levee failures surrounding New Orleans due to Hurricane Katrina in 2005

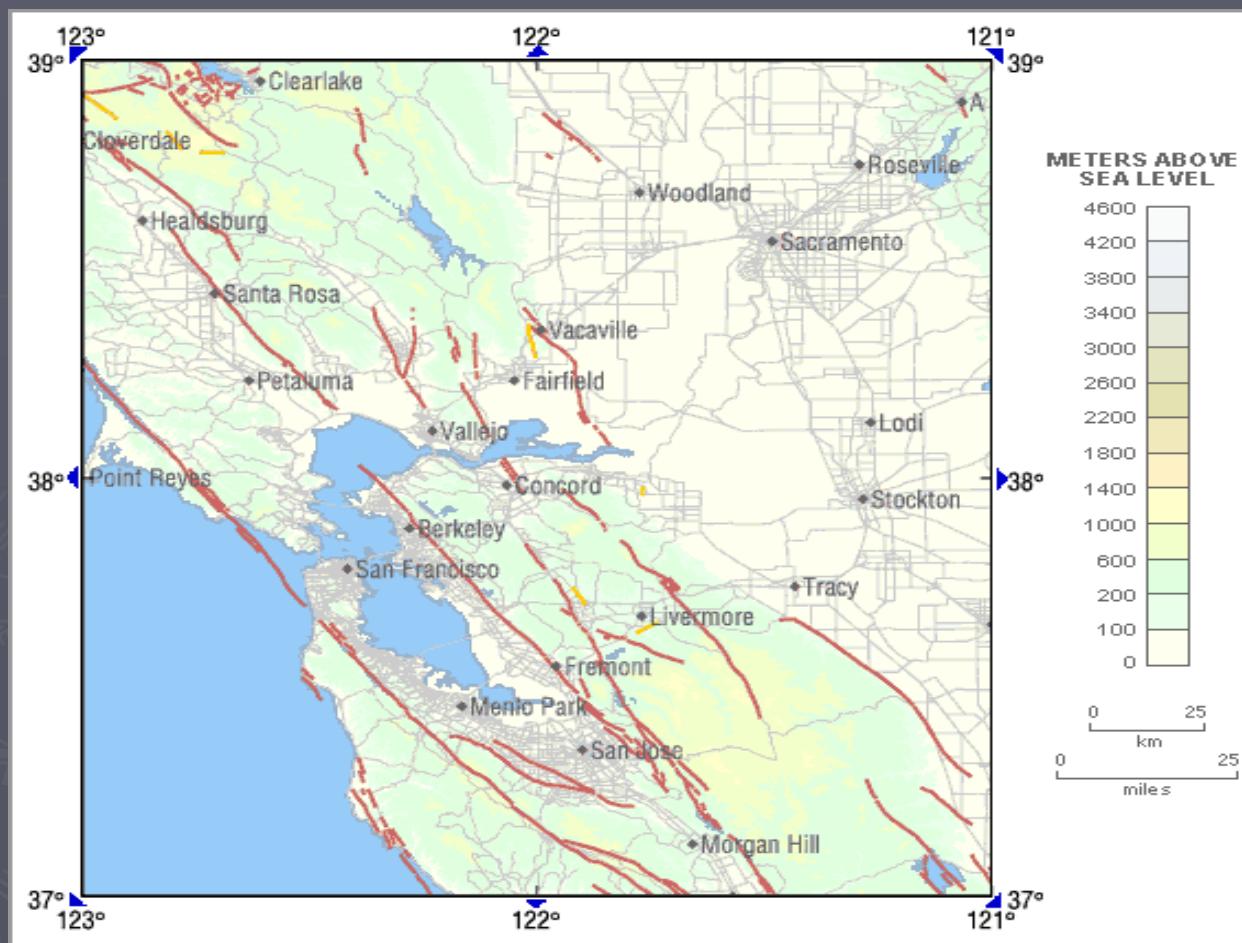


Upper Jones Tract
levee break
July, 2004



Historic California
levee break

The Delta is at the edge of a seismically-active region



- Coast-Range Central Valley Boundary Fault Zone

A magnitude 6.5 earthquake near the Delta is predicted to cause between 30 to 50 levee breaches

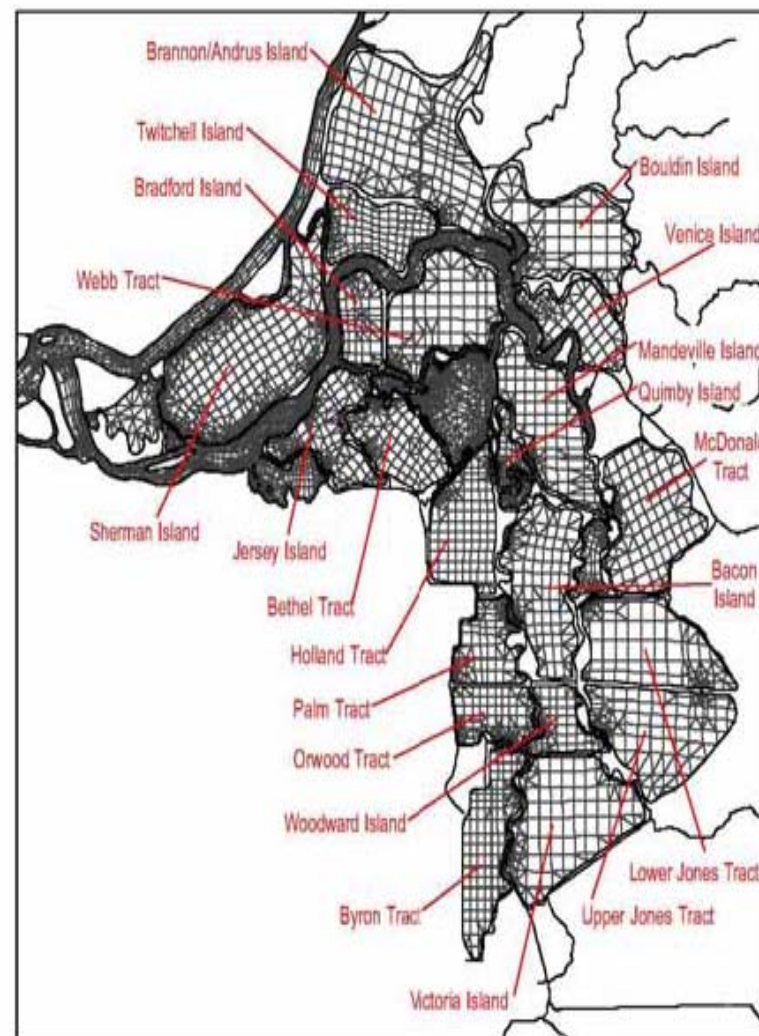


Figure 2-3 Detail of finite element mesh modifications for 50 breach simulations (with Sherman Island breached).

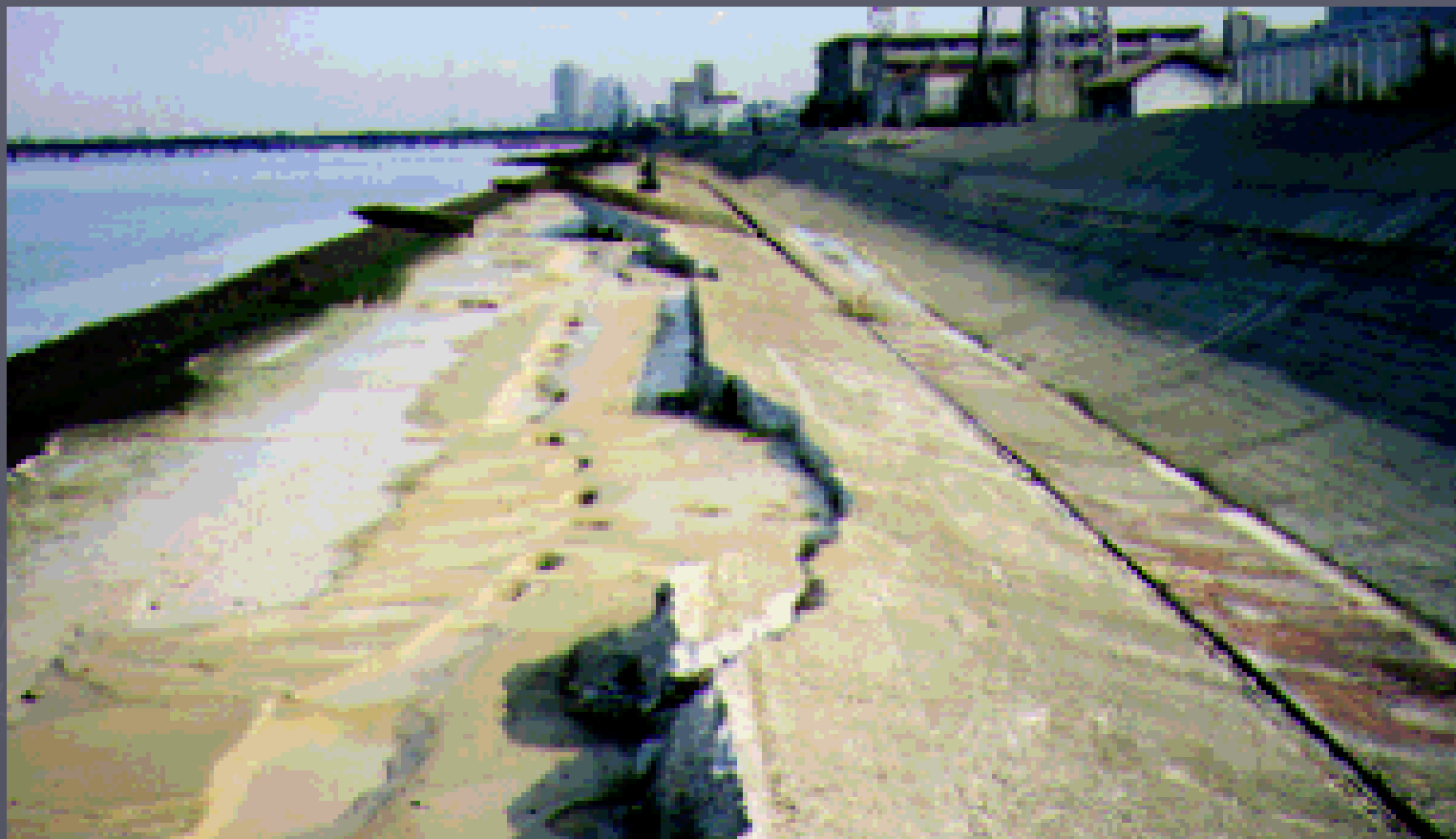
Source: Jack R. Benjamin and Associates, Inc, Resource Management Associates, and Economic Insights, *Preliminary Seismic Risk Analysis Associated with Levee Failures in the Sacramento- San Joaquin Delta*, 2005



Earthquake-induced Levee Failure: Kobe Japan, 1995

NOTE: This levee was engineered for an earthquake zone.

Source: [M. Yoshimine](#)



Earthquake-induced Levee Failure: Kobe Japan, 1995

Source: Bardet et. al., 1995, [The Great Hanshin Earthquake Disaster: The January 17, 1995 South Hyogo Prefecture Earthquake](#), Preliminary Investigation Report.

Thirty to fifty breached levees would lead to a national disaster including:

Salinization of water supply- CVP and SWP pumping halted for over one year



\$ 6 billion damage-
loss of 85,000 acres
of farmland, repair
3,000 homes

Sources of potential oil and hazardous material releases



Duncan



Duncan

- ▶ Oil and hazardous material pipelines
- ▶ Vehicles on highways, trains, barges, vessels
- ▶ Fuel storage tanks on agriculture land

Source: J. M. Duncan,
Virginia Tech (Blacksburg)

Local Response



Reclamation districts' options:

- ▶ Implement Individual Emergency Plans
- ▶ Contact County emergency responders (Sacramento, Solano, and Contra Costa)
- ▶ Contact sole locally-available contractor for emergency repairs
- ▶ Contact Department of Water Resources (DWR) for further assistance

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State Level Response

- ▶ Department of Water Resources (DWR)
- ▶ Office of Emergency Response (OES)
 - Emergency Operations Center (EOC)
 - US Army Corps of Engineers (USACOE) and Federal Emergency Management Agency (FEMA)
- ▶ Department of Fish and Game (DFG)
 - The Office of Spill Prevention and Response (OSPR)

Federal Level Response



► FEMA

- Robert T. Stafford Disaster Relief and Emergency Assistance Act
 - ESF 10 (Environmental Protection Agency)
 - ESF 11 (United States Department of Agriculture)

► U.S. Department of the Interior

- Office of Environmental Policy and Compliance

DOI and OEPC Response

- ▶ Support agency for ESF 10
- ▶ Lead agency for ESF 11, "protection of cultural and historic resources"
- ▶ Bureau of Reclamation- water quantity, local expertise
- ▶ Bureau of Land Management – local expertise, access to archaeologists
- ▶ USGS – fault line and earthquake expertise
- ▶ Fish and Wildlife Service – biologists, scientists, contaminants specialists

Role of OEPC in response

- ▶ Regional leadership
 - Region IX, Oakland, CA
- ▶ Coordination
 - Among DOI Bureaus
 - With local, state, and federal agencies
- ▶ Provide information for:
 - Secretary of the Interior
 - Bureaus
 - On Scene Coordinators
 - Hazmat specialists

Recent Actions

- ▶ Governor Schwarzenegger declared State of Emergency for California's Levees
- ▶ Asked for Federal assistance
 - DHS Secretary Chertoff has agreed to consider but has not offered any guarantees of Federal assistance
- ▶ Strategic Growth Plan
 - \$2.5 B over 10 years for Delta Levee System
 - \$115 M to achieve 200-yr flood protection
 - Seismic fortification

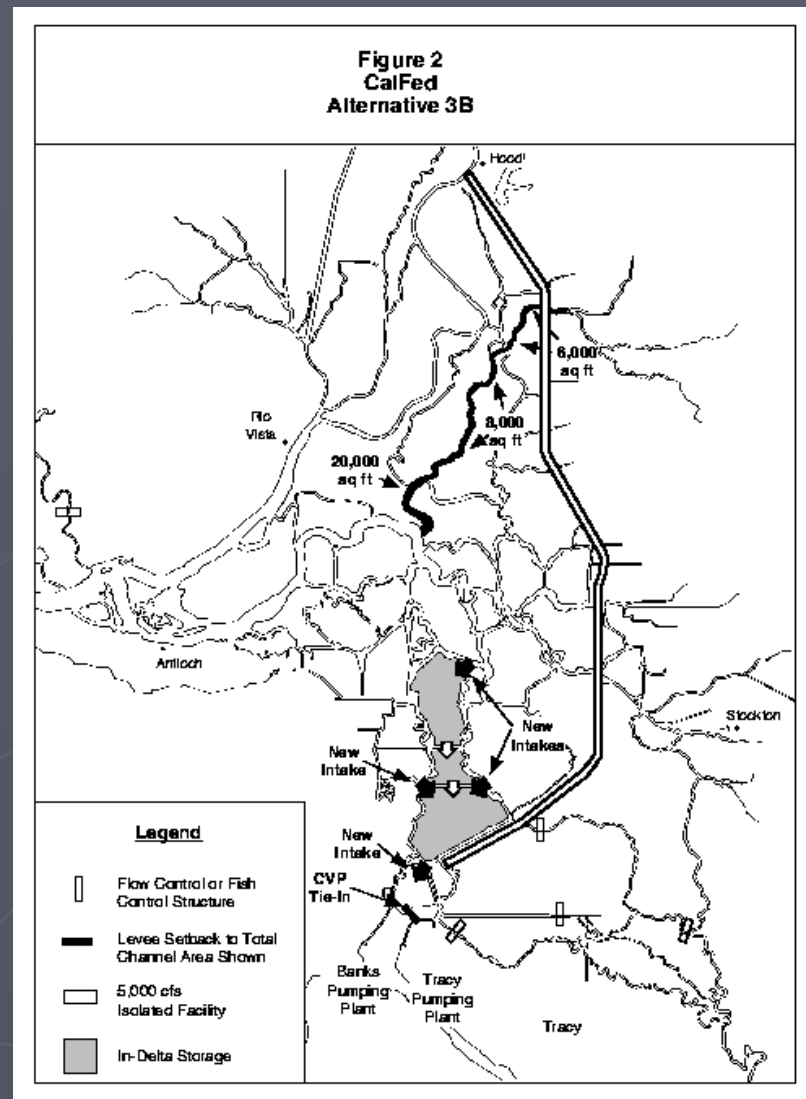
Mitigation Proposals

► Intentional flooding of key islands for in-Delta water storage

- Decrease potential for levee breaches
- Provide reliable water storage
- Restore natural wetlands

► CALFED Isolated Conveyance Facility

- Possibly reduce spring flood flows
- Protect water exports to CVP and SWP intake facilities



Source: DWR Modeling Support Branch, 1997, *Status Reports on Technical Studies for the Storage and Conveyance Refinement Process Alternatives 3A, 3B*

Conclusions

- ▶ Levee system provides:
 - Domestic Water supply for 23 million Californians
 - Agricultural Water supply for Central Valley farms, contributing to local, state, and federal economy: \$500 M annually
 - Critical habitat for native and migratory species
- ▶ Prompt action needed:
 - Ongoing maintenance
 - Seismic retrofiting
 - Reduce further development
 - Environmental research

Conclusions Cont'd

- ▶ CA levees are vulnerable; risks of failures increase each year
- ▶ CA levee system is complex and action requires local, state, and federal cooperation and participation
- ▶ OEPC supports a “lessons learned” approach
- ▶ OEPC will play a coordinating role to help mitigate environmental damage using this approach

Questions

Acknowledgements

- ▶ We wish to acknowledge the generous assistance we received from personnel of the various local, state and federal agencies: including but not limited to: Department of the Interior, CA Department of Water Resources, CA Office of Emergency Services, and Dr. Jeffrey Mount (UC Davis). We also thank Tom Tandoc for his additional research & editorial assistance with this presentation.

For a complete list of works cited, please see accompanying report.

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